

AMENDMENTS TO CLAIMS

- This listing of Claims shall replace all prior versions, and listings, of Claims in the application:

1. – 32. (Cancelled)

33. (New) An apparatus comprising:

a first group of spaced-apart cathode/target assemblies operable to deposit a first sublayer on a substrate, wherein a thickness of said first sublayer increases from an inner diameter to an outer diameter of said substrate;

a second group of spaced-apart cathode/target assemblies operable to deposit a second sublayer on said substrate, wherein a thickness of said second sublayer increases from said inner diameter to said outer diameter of said substrate;

a third group of spaced-apart cathode/target assemblies operable to deposit a third sublayer on said substrate, wherein a thickness of said third sublayer decreases from said inner diameter to said outer diameter of said substrate; and

a transportation unit for transporting said substrate/workpiece past said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies,

wherein said first sublayer, said second sublayer, and said third sublayer collectively form a substantially uniform thickness layer.

34. (New) The apparatus as in claim 33, wherein said first sublayer, said second sublayer, and said third sublayer comprise a magnetically soft underlayer.

35. (New) The apparatus as in claim 34, wherein said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies are in substantial vertical registry.

36. (New) The apparatus as in claim 33, wherein said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies are located in a single vacuum chamber.

37. (New) The apparatus as in claim 33, wherein said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies are located in a plurality of vacuum chambers.

38. (New) The apparatus as in claim 37, wherein said plurality of vacuum chambers form an in-line or a circularly-shaped arrangement of chambers.

39. (New) The apparatus as in claim 33 wherein said first sublayer has a first inclined thickness profile and second sublayer has second inclined thickness profile, wherein said second inclined thickness profile is less inclined than said first inclined thickness profile.

40. (New) The apparatus as in claim 33, further comprising a shield means in spaced adjacency to the periphery of said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies.

41. (New) A method comprising steps of:
transporting at least one substrate/workpiece past a first group of spaced-apart cathode/target assemblies that deposits a first sublayer on said at least one substrate/workpiece, wherein a thickness of said first sublayer increases from an inner diameter to an outer diameter of said at least one substrate/workpiece;

transporting said at least one substrate/workpiece past a second group of spaced-apart cathode/target assemblies that deposits a second sublayer on said at least one substrate/workpiece, wherein a thickness of said second sublayer increases from said inner diameter to said outer diameter of said at least one substrate/workpiece; and

transporting said at least one substrate/workpiece past a third group of spaced-apart cathode/target assemblies that deposits a third sublayer on said at least one substrate/workpiece, wherein a thickness of said third sublayer decreases from said inner diameter to said outer diameter of said at least one substrate/workpiece,

wherein said first sublayer, said second sublayer, and said third sublayer collectively form a substantially uniform thickness layer.

42. (New) The method according to claim 41, wherein said first sublayer, said second sublayer, and said third sublayer comprise a magnetically soft underlayer.

43. (New) The method according to claim 41, wherein said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies form an in-line or circular-shaped arrangement in a single vacuum chamber.

44. (New) The method according to claim 41, wherein said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies are located in a plurality of vacuum chambers and said plurality of vacuum chambers form an in-line or circular-shaped arrangement.

45. (New) The method according to claim 41, wherein said first sublayer has a first inclined thickness profile and second sublayer has second inclined thickness profile, wherein said second inclined thickness profile is less inclined than said first inclined thickness profile.

46. (New) The method according to claim 41, further comprising a shield means spaced adjacent the periphery of the sputtering surface of said first group of spaced-apart cathode/target assemblies, said second group of spaced-apart cathode/target assemblies, and said third group of spaced-apart cathode/target assemblies.

47. (New) The method according to claim 42, wherein said magnetically soft underlayer is about 500 Å to about 4,000 Å thick and is selected from the group consisting of: Ni, NiFe (Permalloy), Co, CoZr, CoZrCr, CoZrNb, CoFeZrNb, CoFe, Fe, FeN, FeSiAl, FeSiAlN, FeCoB, or FeCoC.

48. (New) An apparatus comprising:

a first deposition station having a first group of annularly-shaped magnetron magnet assemblies operable to deposit a first sublayer on a substrate, wherein a thickness of said first sublayer increases from an inner diameter to an outer diameter of said substrate;

a second disposition station having a second group of annularly-shaped magnetron magnet assemblies operable to deposit a second sublayer on said substrate, wherein a thickness of said second sublayer increases from said inner diameter to said outer diameter of said substrate;

a third disposition station having a third group of annularly-shaped magnetron magnet assemblies operable to deposit a third sublayer on said substrate, wherein a thickness of said third sublayer decreases from said inner diameter to said outer diameter of said substrate; and

a transportation unit for transporting said substrate past each deposition station, wherein said first sublayer, said second sublayer, and said third sublayer collectively form a substantially uniform thickness layer.

49. (New) The apparatus as in claim 48, wherein said first sublayer, said second sublayer, and said third sublayer comprise a magnetically soft underlayer.

50. (New) The apparatus as in claim 48 wherein said first disposition station, said second disposition station, and said third disposition station are located in a single vacuum chamber.

51. (New) The apparatus as in claim 48 wherein said first disposition station, said second disposition station, and said third disposition station are located in a plurality of vacuum chambers.

52. (New) The apparatus as in claim 48 wherein said first sublayer has a first inclined thickness profile and second sublayer has second inclined thickness profile, wherein said second inclined thickness profile is less inclined than said first inclined thickness profile.

53. (New) The apparatus as in claim 48 further comprising a shield spaced adjacency to the periphery of said first group of annularly-shaped magnetron magnet assemblies, said second group of annularly-shaped magnetron magnet assemblies, and said third group of annularly-shaped magnetron magnet assemblies.

54. (New) The apparatus as in claim 49 wherein said magnetically soft underlayer is about 500 to about 4,000 Å thick and is selected from the group consisting of: Ni, NiFe (Permalloy), Co, CoZr, CoZrCr, CoZrNb, CoFeZrNb, CoFe, Fe, FeN, FeSiAl, FeSiAlN, FeCoB, or FeCoC.

55. (New) The apparatus as in claim 48, wherein:
said first group of annularly-shaped magnetron magnet assemblies is spaced a first distance from said substrate;
said second group of annularly-shaped magnetron magnet assemblies is spaced a second distance from said substrate; and
said third group of annularly-shaped magnetron magnet assemblies is spaced a third distance from said substrate,
wherein said third distance is greater than said second distance and said second distance is greater than said first distance.

56. (New) An apparatus comprising:
a substrate;
a first sublayer on said substrate wherein a thickness of said first sublayer increases from an inner diameter to an outer diameter of said substrate;
a second sublayer on said substrate, wherein a thickness of said second sublayer increases from said inner diameter to said outer diameter of said substrate; and

a third sublayer on said substrate, wherein a thickness of said third sublayer decreases from said inner diameter to said outer diameter of said substrate, wherein

said first sublayer, said second sublayer, and said third sublayer collectively form a substantially uniform thickness layer.

57. (New) The apparatus as in claim 56, wherein said first sublayer, said second sublayer, and said third sublayer comprise a magnetically soft underlayer.

58. (New) The method according to claim 57, wherein said magnetically soft underlayer is about 500 Å to about 4,000 Å thick.

59. (New) The method according to claim 57, wherein said magnetically soft underlayer is Ni, NiFe (Permalloy), Co, CoZr, CoZrCr, CoZrNb, CoFeZrNb, CoFe, Fe, FeN, FeSiAl, FeSiAlN, FeCoB, or FeCoC.

60. (New) The apparatus as in claim 56 wherein said first sublayer has a first inclined thickness profile and second sublayer has second inclined thickness profile, wherein said second inclined thickness profile is less inclined than said first inclined thickness profile.